NERRS Science Collaborative Progress Report for the Period 09/01/13 through 02/28/14
Project Title: Expanding Living Shorelines within the ACE Basin NERR to Protect Habitat and to Reduce Climate Change Vulnerability through the Application of Collaborative Science-Based Habitat Restoration
Principal Investigator(s): John Leffler
Project start date: September 1, 2012
Report compiled by: John Leffler
Contributing team members and their role in the project:
Blaik Keppler – Collaboration Lead
Peter Kingsley-Smith – Applied Science Lead
Al Segars – field volunteer coordination
Susan Lovelace – facilitation advisor for intended user meetings
Michael Hodges – field logistics and volunteer coordination
Nancy Hadley – applied science consultant
Bruce Doneff – Project Advisory Committee
Clifford Campbell – Project Advisory Committee
Bud Skidmore – Project Advisory Committee
John Fisk – Project Advisory Committee
Queen Quet – Project Advisory Committee
Tony Mills – Project Advisory Committee
Amanda Flake – Project Advisory Committee
Denise Parsick – Project Advisory Committee
Frank Roberts – Project Advisory Committee
Tyler Gault – Project Advisory Committee
William Salters – Project Advisory Committee

A. Progress overview: State the overall goal of your project, and briefly summarize in one or two paragraphs, what you planned to accomplish during this period and your progress on tasks for this reporting period. This overview will be made public for all reports, including confidential submissions.

The overall goal for this project is to address three of the four ACE Basin NERR priority management issues, “Habitat Conservation”, “Water Quality”, and “Community Resilience”, by expanding living shorelines in the ACE Basin through a community-based, intended user-driven collaboration with SCDNR. Specifically, the project seeks to achieve the following goals:

- Create living shorelines that restore and conserve habitat by reducing erosion, improving water quality, and creating ever-growing breakwaters to protect shorelines in an era of climate change-driven sea level rise;
- Enhance communication and cooperation among local user groups;
- Establish habitat restoration lay advisors and monitors who will continue their activities beyond the scope and timeframe of this project; and
- Increase public commitment to stewardship.

During the third six months of this project we primarily reviewed the construction successes of Year 1 and developed plans for Year 2. All of our immediate objectives to date have been accomplished on schedule. A second six hour workshop was hosted on September 10, 2013 at the Nemours Plantation in the ACE Basin. All of the participants from the previous year as well as others who became involved during the year were invited. 31 individuals representing NGOs, government agencies, recreational groups, and schools had planned to participate, and 23 attended. Nine project staff also attended. The intended user roster for that meeting is presented in Table 1. The staff reported on the status of reefs that had been

constructed during the previous six months. The group reviewed and discussed the criteria that they had established the previous year for selecting living shoreline oyster reef construction sites (erosion control, water quality improvement, public access/visibility, and benefits to wildlife). The intended users were provided with detailed maps of the ACE Basin and by working first in teams and then as a whole, they identified specific locations that they felt met the criteria and deserved high priority. In a number of instances they endorsed expanding the work on sites from the previous year as well as nominating new locations. The final part of the workshop involved setting up a lay monitoring program for the reefs already constructed. Memory sticks that not only contained all the presentations and maps used by the group, but also provided a fillable monitoring form were provided to all participants. Volunteers would visit reefs that they had helped to construct or other newly constructed reefs, make a series of observations at low tide from boat or shore, fill in the form, and email it to the project's Science Coordinator for evaluation and archiving. SCDNR teams will make quantitative inspections of all reefs from the previous year in the spring of 2014. Participants were told that they would be notified of these monitoring trips so that they could also participate.

During October and November 2013 two teams of SCDNR biologists, accompanied by volunteers from the workshop, visited all of the workshop-identified sites. Based on a variety of parameters, each site was scored for its suitability for living shoreline construction. This included identifying which of four methods (loose oyster shell, bagged oyster shell, oyster castles, or concrete-coated crab traps) would be suitable for each location.

A concern arose during this period in the form of complaints from a local resident. As mentioned in an earlier report, the local office of the Army Corps of Engineers (ACOE) decided to require reflective orange signage on all oyster castle and crab trap reefs. A reef had been installed on a creek bank opposite a small community of homeowners who lived on the creek. One resident was distressed because the signs interfered with her viewscape. One member of the Project Advisory Committee (PAC) also lived in the community. None of SCDNR staff nor the PAC members were aware that the ACOE would institute the new local practice of requiring the signage when the site was selected. Leffler and Keppler visited the homeowner and discussed the situation with her. SCDNR then replaced the signs with smaller ones one-fourth the original size. The resident was very pleased with the attention and the effort to respond to her concerns. She and her husband were supportive of the living shoreline program and donated eight crab traps for use in future reef construction.

Project staff met with the Project Advisory Committee on December 3, 2013 to report on the recommendations for each workshop-identified site. With the issue of viewscape that had arisen, the survey teams had been instructed to note possible problems with a location in regard to property owners along the waterway. The PAC members discussed the question of viewscape degradation and decided to add it as a fifth criterion to be considered in selecting reef construction sites. A laptop with GoogleEarth was provided to the PAC so that aerial views of potential sites could be evaluated for possible viewscape degradation. The Committee members evaluated the merits of each location (Table 2), prioritized those sites to be addressed during the second year of the project, and allocated the resources to each site. During Year 2, the PAC decided to install 2900 shoreline feet of loose shell, 750 feet of bagged shell, 850 feet of oyster castles, and 350 feet of crab traps, representing an increase of 550 shoreline feet over the previous year. Seventeen sites were selected for Year 2 activities (Table 3). PAC members made suggestions of how reef building sessions might be scheduled to increase volunteer participation. The PAC also discussed the fourth project goal, to increase public commitment to stewardship. Suggestions were made to integrate stewardship development activities into the next large workshop.

Since the Project Advisory Committee meeting, the staff biologists and volunteer coordinators have been purchasing materials, organizing the logistics of assembling materials and transportation, and working with the various intended user groups to organize volunteers

who will assist with reef construction. Kingsley-Smith, Stone, and Leffler met with ACOE representatives to discuss their criteria for issuing permits this year. Permit applications have been filed and modifications made in consultation with the ACOE. All reefs will be constructed between April and July 2014. Through other funding sources the ACE Basin NERR has committed to supporting a graduate student for twelve months to evaluate both this project and the Low Impact Development Science Collaborative project. Chris Berg will base his Masters thesis on these evaluations. He is enrolled in the College of Charleston's Masters of Environmental Studies graduate program.

B. Working with Intended Users:

- Describe the progress on tasks related to the integration of intended users into the project for this reporting period.
    - The selection of specific reef building sites and the allocation of resources to each location were decided by the intended users who participated in the September workshop and who served on the Project Advisory Committee (PAC) that met in December. During this reporting period we worked with a variety of intended user groups including schools, fishing and environmental clubs, government agencies, commercial oystermen, and individuals from the community.

- What did you learn? Have there been any unanticipated challenges or opportunities?
    - We have been somewhat surprised by how well the work with the intended users continues to go. They are extremely enthusiastic and invested in this work. The signage problem with the ACOE was unanticipated from the history that we have had with oyster reef construction. That has led us to select sites earlier this year to allow additional time for permitting. The signage also introduced the viewscape issue. The specific situation that raised concerns was dealt with effectively and all parties were pleased. The issue did provide the opportunity for the intended users, particularly the PAC members, to discuss the concept of viewscapes and to incorporate viewscape preservation in their prioritization of sites for Year 2.

- Who has been involved?
    - During this reporting period 23 intended user representatives (Table 1) were involved in the workshop and nine PAC members made the final site prioritizations and resource allocations. A number of volunteers accompanied the survey crews during the fall. Volunteers, possibly ~300, are currently being scheduled for the spring reef building activities. Ten SCDNR staff members are involved in planning and directing these activities.

- Has interaction with intended users brought about any changes to your methods for integration of intended users, the intended users involved, or your project objectives?
    - Generally no; the project is proceeding pretty much as planned. The concerns expressed over viewscape are important considerations and have been incorporated into the primary criteria for site selection.

- How do you anticipate working with intended users in the next six months?
    - Between April and July, intended user volunteers from the organizations represented at the September workshop will be involved with project staff in the construction of the living shorelines at the priority sites selected by the PAC. This will require considerable organization of the construction materials, the transportation requirements, and the volunteers. Intended users will also be notified of SCDNR

quantitative monitoring trips to the reefs constructed the previous year and it is expected that several volunteers will participate on each trip.

C. Progress on project objectives for this reporting period:

- Describe progress on tasks related to project objectives for this reporting period.

The specific collaborative objectives are to
1. Conduct a facilitated process with intended users to prioritize restoration sites;
    - This was accomplished through the September workshop and through the December Project Advisory Committee meeting.

2. Establish a Project Advisory Committee (PAC) to organize and coordinate the volunteer efforts and to provide advice on all facets of the project;
    - The PAC was organized last year. It met again in December 2013 and its members prioritized construction sites for Year 2 and advised on other issues such as viewscape considerations and approaches for increasing stewardship commitments. Its members will continue to assist throughout the spring in coordinating volunteers and boats for the reef building days.

3. Recruit and coordinate an extensive volunteer program necessary for the success of this program;
    - During this reporting period 23 intended user representatives were involved with the workshop, nine with the PAC, and a number of others with the field evaluations. Efforts are underway to schedule close to 300 volunteers for the reef construction activities this spring.

4. Establish and train a team of lay monitors who will act as stewards of the restored sites and report observations to the SCDNR during and beyond the termination of this grant;
    - This objective was addressed at the September 10th workshop. There is interest in accompanying SCDNR biologists to the sites this spring, but to date there seems to be little interest in the lay monitoring program. This will be addressed by the PAC for incorporation in the next large workshop in the fall.

5. Improve communication and coordination among all the groups involved with the project and develop a mechanism for continuing feedback to the SCDNR and the ACE Basin NERR staff regarding the management of the Reserve's resources.
    - This process has begun well and we hope to establish a continuing network of involved intended users through the success they experience with this project. How to structure activities that encourage this was discussed with the PAC in December. We plan to devote part of the final workshop to encouraging further networking among groups with the goal of increasing cooperation and a sense of stewardship.

The applied science objectives for this project are to
1. Utilize state-of-the-art GIS techniques and on-the-ground site evaluations to provide information and expertise to the intended users' group on the distribution of habitat suitable for living shoreline restoration and enhancement;
    - SCDNR's Shellfish Section GIS specialist constructed a variety of maps that were used by the workshop and PAC participants in making their decisions. SCDNR staff, accompanied by volunteers, assessed all the sites for characteristics such as wave energy, surface firmness, shoreline elevation, and linear feet in need of reef

construction. Recommendations were developed regarding the most effective reef construction methodologies to apply at each location.

2. Evaluate sites identified and prioritized as being of critical concern to intended users and select appropriate best management practices (BMPs) for each site;

- Site evaluations by SCDNR staff and volunteers were made October and November. Best management practice reef construction methodologies were recommended at the Project Advisory Committee meeting in December.

3. Implement the most effective habitat restoration and enhancement techniques (outlined below) for the selected sites based on the expertise and previous experiences of the applied science team;

- Year 2's work will be accomplished between April and July 2014.

4. Allocate specified acreage, linear extent, or numerical goals for each shoreline habitat restoration technique by working with intended users to coordinate volunteers in restoration efforts;

- At the Project Advisory Committee meeting in December the committee members allocated all of the available Year 2 resources to the sites that they prioritized. Volunteers are currently being recruited and organized for the actual construction efforts planned for later in the spring.

5. Coordinate post-construction reef monitoring with intended users (lay monitors) and provide feedback on the effectiveness of the habitat restoration efforts.

- Lay monitoring training was held at the September 2013 workshop. SCDNR staff with intended user volunteers will evaluate the reefs this spring approximately one year after their construction.

- What data did you collect?
  - The following data were collected during October and November by the staff/volunteer evaluation teams for each of 46 sites identified at the workshop. Site name
    Date assessed
    County
    Latitude
    Longitude
    Viable restoration strategies
    Potential viewscape degradation
    Creek width (m)
    Slope measurements (average of 3 measurements at each site)
    Distance from MLW to edge of marsh
    Distance from marsh to back edge of future restoration reef
    Sediment type (e.g., mud, mud/clay, shell, etc.)
    Sinkability (cm) Shell matrix depth (beneath sediment surface, cm)
    Nearby oyster abundance (1-5, where 1=no oysters nearby)
    Distance to nearest oysters (m)
    Potential length of available substrate (m)
    Potential width of available substrate (m)
    Potential area of available substrate (length x width, m2)
    Creek form (straight vs. curved) shoreline site occurs on when looking downstream (left vs. right)
    Nearby structures (check all that apply, e.g., docks, houses, boat landing, marina)

Distance to nearest access point
SCDNR Management Status (e.g., State Shellfish Ground, Undesignated, Culture Permit) SCDHEC Status (e.g., Prohibited, Restricted)

- Has your progress in this period brought about any changes to your methods, the integration of intended users, the intended users involved or the project objectives?
  - Nothing major. We came to recognize the viewscape concerns that are caused by the signage required by the ACOE. As a result we incorporated viewscape protection into our criteria for site selection. Because of the ACOE concerns about the oyster castle and crab trap methods, we have started working with that agency earlier to better navigate the permitting process. In general, the plan for interaction with the intended users, and who is involved, has gone very well.

- Have there been any unanticipated challenges, opportunities, or lessons learned?
  - We are still dealing with the change in the ACOE's permitting system, but have adjusted the timing of permit application and have incorporated viewscape considerations into site selection.

- What are your plans for meeting project objectives for the next six months?
  - The Year 2 sites have been selected by the PAC. Building materials are being purchased and transport contracts sent out for bid. Work is ongoing to schedule volunteer groups for specific dates and builds. Scheduling of all work dates for the spring and summer is nearly complete. We anticipate a well-planned and productive six months. We will plan for a PAC meeting during the summer and will discuss plans for a final workshop to be held in the fall.

D. Benefit to NERRS and NOAA: List any project-related products, accomplishments, or discoveries that may be of interest to scientists or managers working on similar issues, your peers in the NERRS, or to NOAA. These may include, but are not limited to, workshops, trainings, or webinars; expert speakers; new publications; and new partnerships or key findings related to collaboration or applied science.
  - A description of this project, emphasizing the intended user-driven nature of the work, was presented at
    - the Beaufort (SC) Sportfishing and Diving Club on December 12, 2013. (Kingsley-Smith)
    - the Edisto Island Preservation Alliance on January 18, 2014. (Kingsley-Smith)
    - Stone, B.W., P.R. Kingsley-Smith, B.P. Keppler, J.W. Leffler. Expanding Living Shorelines through Stakeholder-Driven Site Selections for Intertidal Oyster Reef Building in the ACE Basin NERR, South Carolina. Presented at the *2013 Southeast Tidal Creeks Summit*, Wilmington, NC, December 16-17, 2013.
    - Kingsley-Smith, P., B.P. Keppler, S. Lovelace, K. Madden, J. Leffler. You Can't Always Get What You Want… Or Can You? A Collaborative Approach to Oyster Reef Habitat Restoration in the ACE Basin NERR, South Carolina, USA. Presented at the *Social Coast Forum*, Charleston, SC, February 18-20, 2013.

  Dr. Peter Kingsley-Smith is scheduled to present a nationally broadcasted webinar, Expanding Living Shorelines within the ACE Basin NERR to Protect Habitat and to Reduce Climate Change Vulnerability, at 2:00 PM EST on March 12, 2014.

E. Describe any activities, products, accomplishments, or obstacles not addressed in other sections of this report that you feel are important for the Science Collaborative to know.

- None

Table 1. Intended users who participated in the September 10th workshop that reviewed site selection criteria, identified sites for reef construction in Year 2, and discussed formation of a lay monitoring program. The participants represented a diverse group of organizations.

Expanding the ACE Basin's Living Shoreline		
Tuesday, September 10, 2013		
Nemours Plantation		
Terry Stone	SCORE volunteer, CCA member,	tstone1313@gmail.com
George J. Madlinger, III	SCDHEC/OCRM	madlingj@dhec.sc.gov
Frank Roberts	Lady's Island Oyster	ladyioyster@enbarqmail.com
Fred Kinard	SC Wildlife Federation	fredkinard@hotmail.com
Beverly Marshall	SC Wildlife Federation	
EV Bell	SC Sea Grant Consortium	elizabeth.vernon@scseagrant.org
William Salters	SCDHEC-OCRM	william.salters@dhec.sc.gov
Laura Lee Rose	Clemson Extension	lrose@clemson.edu
Katie Cox	Beaufort County School District Science/STEM Coordinator	katie.cox@beaufort.k12.sc.us
Mike Pearson	SCDHEC - Shellfish Program	pearsodm@dhec.sc.gov
Amanda Flake	Beaufort County	aflake@bcgov.net
Bob Sandifer	Edisto Island Preservation Alliance	sandifeb@bellsouth.net
Queen Quet	Gullah/Geechee Sea Island Coalition	GullGeeCo@aol.com
Joy Brown	The Nature Conservancy	joy_brown@tnc.org
Tony Mills	LowCountry Institute	tmills@lowcountryinstitute.org
E.M. "Bud" Skidmore	Edisto Island Preservation Alliance	emskidmore@aol.com
Bess Kellett	Botany Bay Plantation WMA	KellettB@dnr.sc.gov
Frank Gibson	Beaufort Sportfishing and Diving Club	fgibson@islc.net
Chris Hernandez	US Fish and Wildlife Service	christopher_hernandez@fws.gov
James S. Rosen	Beaufort Sail and Power Squadron	jsrr02@aol.com
Diane Leone	USDA Natural Resource Conservation Service	Diane.Leone@sc.usda.gov
Tria Yang	USDA Natural Resource Conservation Service	tria.yang@sc.usda.gov
Shelby Berry	Beaufort Soil and Water Conservation District	shelby.berry@sc.nacdnet.net
Cancelled		
Janie Lackman	Fripp Island Turtle Program	Janie.lackman@gmail.com
James Rader	Ducks Unlimited	jrader@ducks.org
Denise Parsick	Beaufort Soil & Water Conservation District	dparsick@embarqmail.com
Blair N Williams	DHEC - OCRM	williabn@dhec.sc.gov
Sarah Latshaw	DHEC-OCRM	sarah.latshaw@dhec.sc.gov
Bruce Doneff	Friends of Hunting Island	doneff@verizon.net
Jon Greider	Edisto Beach State Park	jgreider@scprt.com
Will Doar	SC DNR Geological Survey	doarw@dnr.sc.gov

Table 2. Summary of the possible sites selected by intended users in the September 10th workshop. Some sites were selected the previous year, but participants thought that additional construction should occur at those locations. Available linear shoreline, viable strategies, priority assigned by the Project Advisory Committee, and the criteria scoring system are shown.

	LOCATION	SITE #	Shoreline ft available	Viable strategies	# Black chips	Bags	Loose	Castles	Traps	Water quality	Wildlife	Visible / Accessible	Erosion	Viewscape	TOTAL SCORE
SITES IDENTIFIED IN YEAR 1	Beaufort River	2A	160 ft	Traps	2				150	0	1	1	0	1	3
		2B	90 ft	Bags	3	100				0	0	1	1	1	3
	Lucy Point Creek	6A	50 ft	Traps						0	0	1	1	1	3
		6B	140 ft	Bags / Castles	3			150		0	0	1	1	1	3
	Whale Branch	7	40 ft	Bags						1	1	1	0	1	4
	Hunting Island	8	250 ft	Bags						0	1	1	1	1	4
	Coosaw Cut	12	> 500 ft	Bags / Traps / Castles	0			200		0	1	1	1	1	4
		13	1310 ft	Traps						0	1	1	0	1	3
	Combahee River	15	140 ft	Bags / Castles						0	1	0	1	1	3
	Big Bay Creek	17	120 ft	Bags / Traps	3	150				1	1	1	1	1	5
	Scott Creek	18	170 ft	Bags / Traps / Castles						1	1	0	1	1	4
		19	40 ft	Bags / Traps						1	1	0	1	1	4
	St. Pierre Creek	20	160 ft	Traps						1	1	0	0	1	3
	Fenwick Cut	21	410 ft	Bags						0	1	1	1	1	4
	Ocella Creek	23	150 ft	Bags						0	0	0	0	1	1
	Steamboat Creek	24A	530 ft	Traps						0	1	1	0	1	3
		24B	150 ft	Traps	2				100	0	1	1	0	1	3
	Russell Creek	25A	50 ft	Bags / Traps						0	0	1	1	0	2
SITES IDENTIFIED IN YEAR 2	Lady's Island	27	90 ft	Bags						0	1	1	0	1	3
	Coosaw River	28A	330 ft	Bags / Castles						0	1	0	1	1	3
		28B	600 ft	Bags / Loose / Castles						0	1	0	1	1	3
		28C	940 ft	Bags / Castles	2	350		200		0	1	0	1	1	3
		28D	930 ft	Bags / Castles						0	1	0	1	1	3
		28E	620 ft	Bags						0	1	0	1	1	3
		28F	480 ft	Bags / Castles						0	1	0	1	1	3
		29	530 ft	Loose	0		400			0	1	0	0	1	2
	Lucy Point Creek	30	300 ft	Traps						0	1	0	0	1	2
	Jenkins Creek	31A	1050 ft	Traps	1				100	0	0	1	1	1	3
		31B	820 ft	Bags						0	1	1	0	1	3
		31C	90 ft	Bags / Traps	6	100				0	1	1	1	1	4
	Morgan River	32A	1490 ft	Bags / Loose / Castles	1		300	200		0	1	0	1	1	3
		32B	500 ft	Traps						0	1	0	1	1	3
	Ashe Island	34A	740 ft	Traps						0	1	0	0	1	2
		34B	160 ft	Bags / Castles						0	1	0	1	1	3
		34C	630 ft	Traps / Castles						0	1	0	1	1	3
	Fenwick Island	35	190 ft	Bags						0	1	1	1	1	4
	South Edisto River	36A	520 ft	Loose	0		600			1	1	0	1	1	4
		36B	190 ft	Loose / Traps	0		200			1	1	0	1	1	4
	St. Pierre Creek	37	900 ft	Loose	0		900			1	1	0	1	1	4
		38A	300 ft	Traps						1	1	0	1	1	4
		38B	130 ft	Bags						1	1	0	1	1	4
	Fishing Creek	39	160 ft	Bags / Traps / Castles	4	50		100		1	1	1	1	1	5
	Ocella Creek	40A	80 ft	Bags / Castles						0	1	0	0	1	2
		40B	90 ft	Traps						0	1	0	0	1	2
	Dawho River	41A	110 ft	Bags / Loose / Castles	0		200			1	1	0	1	1	4
		41B	150 ft	Bags						0	1	0	1	1	3
		41C	340 ft	Bags / Loose / Traps	0		300			1	1	0	1	1	4
				Total	27	750	2900	850	350						

Table 3. Year 2 sites selected by the Project Advisory Committee and the number of linear shoreline feet assigned by construction method to each site.

Linear Shoreline Feet to be Restored in Year 2					
LOCATION	SITE #	Bags (ft)	Loose (ft)	Castles (ft)	Traps (ft)
Beaufort River	2A				**150**
Beaufort River	2B	**100**			
Lucy Point Creek	6B			**150**	
Coosaw Cut	12			**200**	
Big Bay Creek	17	**150**			
Steamboat Creek	24B				**100**
Coosaw River	28C	**350**		**200**	
Coosaw River	29		**400**		
Jenkins Creek	31A				**100**
Jenkins Creek	31C	**100**			
Morgan River	32A		**300**	**200**	
South Edisto River	36A		**600**		
South Edisto River	36B		**200**		
St. Pierre Creek	37		**900**		
Fishing Creek	39	**50**		**100**	
Dawho River	41A		**200**		
Dawho River	41C		**300**		
	Total	750	2900	850	350

Figure 1. Intended users participating in the September 2013 workshop to review the first year's progress, identify specific locations for living shoreline construction in Year 2, and establish the framework for the lay monitoring program.

Figure 2. Members of the Project Advisory Committee meeting in December 2013 to prioritize sites for living shoreline construction in Year 2 and to allocate the available resources among locations. The group also discussed viewscape issues resulting from required signage and approaches for increasing volunteer turnout and commitment to long term stewardship.

Figure 3. Map indicating the sites selected by the Project Advisory Committee for living shoreline oyster reef construction during Year 2. These have been added to those sites constructed during Year 1. All new sites were nominated at the September 2013 workshop, evaluated by SCDNR staff and volunteers during the fall.